

82734

An Ionization Method for Determining Absorbed
Energy in Mixed Fluxes of Fast Neutrons and
 γ -Rays

S/089/60/009/002/005/015
B006/B056

and thermal neutron fluxes. The energy, W , necessary for the formation of ion pairs in the filling gases amounted to 27 ev, 33.5 ev, and 30.2 ev for the three chambers used. The data concerning the chemical composition of the biological tissues (Table 1) and the corresponding mass absorption coefficients are used to calculate the coefficients a_i and b_i (a_i denote the ratios between the true mass absorption coefficients of the wall material of the i -th chamber and the true mass absorption coefficients of the tissue; b_i denote the ratios between the energy absorbed in 1 g of the wall material of the i -th chamber and the energy absorbed in 1 g of tissue). The true mass absorption coefficients μ/ρ and the values of a_i for muscle and bone tissue as well as polyethylene, Aerion, and graphite are given in Table 2, and the values of b_i (for different neutron spectra) in Table 3. The b_i -values do not depend on the shape of the spectrum within the limits of measuring accuracy, which is of great importance, because it is not necessary to take the change in the spectral composition of the

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An Ionization Method for Determining Absorbed
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 γ -Rays

S/089/60/009/002/005/015
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neutron flux into account when determining the tissue doses at various depths. The doses $D_1 - D_3$ absorbed in the walls of the three chambers correspond to the following doses absorbed in muscles and bones:

Polyethylene: $1.04 D_{\gamma}^m + 1.41 D_n^m = D_1$; $1.07 D_{\gamma}^b + 2.15 D_n^b = D_1$.

Aerion: $0.96 D_{\gamma}^m + 0.55 D_n^m = D_2$; $0.98 D_{\gamma}^b + 0.85 D_n^b = D_2$.

Graphite: $0.915 D_{\gamma}^m + 0.105 D_n^m = D_3$; $0.94 D_{\gamma}^b + 0.18 D_n^b = D_3$.

From these relations it is possible to calculate the tissue doses. The neutron-sensitivities of the chambers were between 0.2 and 8 Mev. A final investigation of the measurement of absorbed energy (for neutrons) resulted in an error of $\sim 15\%$. It depends only little on D_n/D_{γ} . The authors thank

Yu. F. Chernilin for his help, and G. B. Radziyevskiy for discussions. There are 3 figures, 3 tables, and 17 references: 6 Soviet, 2 British, 3 US, and 1 German.

SUBMITTED: April 11, 1960

Card 4/4

KUZIN, A.M.; ISAYEV, B.M.; KHVOSTOVA, V.V.; TOKARSKAYA, V.I.; BREGADZE,
Yu.I.

Effectiveness of the biological action of C^{14} during its
incorporation into living structures. Dokl. AN SSSR 134 no.4:
951-954 0 '60. (MIRA 13:9)

1. Institut biologicheskoy fiziki Akademii nauk SSSR. 2. Chlen-
korrespondent AN SSSR (for Kuzin).
(CARBON--ISOTOPES)
(PLANTS, EFFECT OF RADIOACTIVITY ON)

BREGADZE, Yu. I, ISAYEV, B.M. , KVASOV, V.A.

"Ionization Technique for Evaluation of the Absorbed Energy in the
Mixed Fluxes of Fast Neutrons and Gamma Rays."

Report presented at the meeting on Radiation Dosimetry, Intl.
Atomic Energy Agency,
Vienna, 7 - 11 June '61

8/747/62/000/000/016/025
D296/D307

AUTHORS: Kuzin, A. M., Isayev, B. M., Khvostova, V. V., Tokarskaya, V. I. and Bregadze, Yu. I.

TITLE: The biological effect of C^{14} incorporated into living tissues

SOURCE: Radiatsionnaya genetika; sbornik rabot. Otd. biol. nauk AN SSSR. Moscow, Izd-vo AN SSSR, 1962, 267-273

TEXT: After the performance of nuclear tests the content of radioactive carbon in the atmosphere increased between 1955 and 1958 at 5% annually. When assessing the possible biological effects of these doses they are usually estimated by the radiosensitivity of living tissues exposed to the external source of radiation. These calculations fail, however, to take into consideration the special geometry of incorporation of C^{14} into radiosensitive structures such as chromosomes as well as the so-called transformation effect in DNA molecules ($C^{14} \rightarrow N^{14}$). These effects may lead to more frequent aberrations.

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S/747/62/000/000/016/025
D296/D307

The biological effect ...

tions than expected from calculations on the basis of the dose to which the cells are exposed. The authors compared the biological effect of C^{14} incorporated into plant seedlings, with the effect of exposure to external gamma radiation emitted by Co^{60} . Normally growing 10-day old plants were placed into a photosynthesis chamber containing $C^{14}O_2$ (total activity $100 \mu C$, volume of chamber $22.5 dm^3$); radioactivity of the inner layer of the plants was estimated on scintillation counters and the tissues were investigated cytologically, counting the proportion of micronuclei and the mitotic index. The percentage of cells with chromosome aberrations increased from 0.16% in the control plants to 0.26% in the experimental plants. Plant cells exposed to more than double the dose of radiation (Co^{60}) showed a slight increase in the number of aberrations but calculation revealed that the mutagenic effect of incorporated C^{14} was ten times higher than that of an equal dose of external irradiation. It was that the transformation effect $C^{14} \rightarrow N^{14}$ as well as

BREGADZE, Yu.I.; ISAYEV, B.M.; KVASOV, V.A.; LEVIN, B.A.; CHERNILIN, Yu.F.

Production of "pure" fluxes of fast neutrons for radiobiological
works using an IRT-100C reactor. Atom. energ. 12 no.6:537-538
Je '62. (MIRA 15:6)
(Nuclear reactors) (Neutrons) (Radiobiology)

L 53942-65 EWT(m)/EPF(c)/EPF(n)-2/EWG(m)/EPR Pt-4/Ps-4/Pu-4 WW

ACCESSION NR: AT5013235

UR/3119/64/000/002/0003/0011

AUTHOR: Bregadze, Yu. I.; Breykin, I. V.; Gubatova, D. Ya.; Kemer, R. Ya.; Lapenas, A. A.

TITLE: Equipment and dosimetric studies in the biological channel of the IRT-2000 reactor 19

SOURCE: AN LatSSR. Institut fiziki. Radiatsionnaya fizika, no. 2, 1964.
Dosimetriya neytronov i gamma-luchey (Dosimetry of neutrons and gamma rays), 3-11

TOPIC TAGS: reactor biological channel, reactor channel neutron spectrum, reactor channel Gamma ray, neutron spectrum variation, radiation dosimetry, tissue dose

ABSTRACT: The article describes the technical details of the equipment of the biological channel (No. 8) of the IRT-2000 reactor at the Institut fiziki AN Latviyskoy SSR (Physics Institute, AN Latvian SSR), based on the experimental equipment of the No. 1 channel of the IRT reactor at the Institute atomnoy energii im. I. V. Kurchatova (Institute of Atomic Energy). Dosis measurements showed that: 1) the range of intensities is sufficient for the most varied types of biological investigations; 2) the minimum admixture of gamma rays is 11% of

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L 53942-65

ACCESSION NR: AT5013235

3

the total tissue dosis; 3) fast neutrons do not exhibit any significant change in spectrum along the channel; 4) the weakening of the tissue dosis of fast neutrons across the depth of hydrogen-containing biological objects within the channel is accompanied by fast-neutron spectrum changes in the direction of higher energies; 5) a more accurate determination of the absolute value of the tissue dosis requires the knowledge of the entire neutron spectrum and also the spectrum of the gamma rays present. "The authors thank K. K. Baltmugur for valuable advice during the course of the study and for the discussion of the results, and Ye. M. Kashlinskiy for his help during the work." Orig. art. has: 6 figures.

ASSOCIATION: Institut biologicheskoy fiziki AN SSSR (Institute of Biophysics AN SSSR); Institut biologii AN Latviyskoy SSR (Institute of Biology AN Latvian SSR); Institut fiziki AN Latviyskoy SSR (Institute of Physics AN Latvian SSR)

SUBMITTED: 00

ENCL: 00

SUB CODE: NP, LS

NO REF SOV: 003

OTHER: 001

SR
Card 2/2

BREGADZE, Yu.I.; BREYFISH, I.V.; GUBATOVA, D.Ya.; KEMER, R.Ya. [Kemers, R.];
LAPENAS, A.A.

Channel of the IRT-2000 reactor for radiobiological investigations.
Radiobiologiya 4 no.4:627-631 '64. (MIRA 17:11)

1. Institut fiziki AN Latviyskoy SSR, Institut biologii AN Latviyskoy SSR i Institut biologicheskoy fiziki AN SSSR, Moskva.

KUZIN, A.M.; GLEMBOTSKIY, Ya.L.; LAPKIN, Yu.A.; KALENDO, G.S.; BREGADZE, Yu.I.;
MAMUL', Ya.V. [deceased]; MYASNYANKINA, Ye.N.

Mutagenic effectiveness of incorporated C¹⁴. Radiobiologiya 4 no.6:
804-809 '64. (MIRA 18:7)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.

L 54042-65

ACCESSION NR: AP5010331

UR/0205/65/005/002/0174/0178

AUTHOR: Trinchin, K. S.; Kuzin, A. M.; Bregadze, Yu. I.;
Gintsburg, E. I.

13
20

TITLE: Radiation damage produced by different types of radiation in erythrocytes suspended in native and protein-free media

SOURCE: Radiobiologiya, v. 5, no. 2, 1965, 174-178

TOPIC TAGS: radiation damage, erythrocyte, protein-free medium, blood medium, gamma ray RBE, fast neutron RBE

ABSTRACT: Fresh blood of rats was used to irradiate erythrocytes in physiological solutions (1:100) and in their native media (1 ml blood) with 5 krad doses of fast neutrons, hard X-rays, and gamma rays. Following irradiation, 99 ml of physiological solution were added to the irradiated 1 ml blood samples to form erythrocyte suspensions of the same concentration (1:100). Non-irradiated suspensions served as the control. An isotonic alkaline buffer (pH 9.97) was added to all 3 types of erythrocyte suspension and the kinetics of the hemolysis process was studied by a photocolorimetric method. In parallel samples optical density was determined. For a 5 krad dose,

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ACCESSION NR: AP5010331

the RBE of fast neutrons compared to gamma rays is approximately 1.3 for erythrocytes in a protein-free medium and approximately 3.5 for erythrocytes in a native blood medium. The RBE of hard X-rays is approximately 1.3 for erythrocytes in a protein-free medium and approximately 1.2 for erythrocytes in blood. The radioprotective effect of extracellular proteins on erythrocytes is more clearly expressed with gamma ray and hard X-ray irradiation than with fast neutrons. With gamma and hard X-ray irradiation of erythrocytes in a protein-free medium, the cellular structure is affected mostly by the indirect action of the radicals of the extracellular water, and with fast neutron irradiation the structure is acted upon directly. With irradiation of erythrocytes in a native blood medium, radiation damage of cellular structure is caused primarily by the direct action of radiation. Orig. art. has: 2 figures and 3 tables.

ASSOCIATION: Institut biologicheskoy fiziki AN SSSR, Moscow
(Biological Physics Institute, AN SSSR)

SUBMITTED: 02Nov64

ENCL: 00

SUB CODE: 13

NR REF SOV: 004

OTHER: 008

Card 2/2

BREGADZE, Yu.I.

Utilization of ionizing chambers for evaluating average
energy spectra of fast neutrons in radiobiological tests.
Radiobiologiya 5 no.5:744-751 '65. (MIRA 18:11)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.

TRINCHER, K.S.; KUZIN, A.M.; BREGADZE, Yu.I.; GINTSBURG, E.I.

Radiation injury of erythrocytes, suspended in native and protein-free medium, by various kinds of irradiation.
Radiobiologiya 5 no.2:174-178 '65.

(MIRA 18:12)

1. Institut biologicheskoy fiziki AN SSSR, Moskva.

L 1925-66 EWT(m)/EWP(1)/EWP(1)/EWP(t)/EWP(b)/EWA(h)/EWA(1) LJP(c) JD/DM/RM

ACCESSION NR: AP5023780

UR/0089/65/019/003/0309/0311
621.387.422

51
45
B

AUTHOR: Bregadze, Yu. I. 44.55

TITLE: Disturbance of the homogeneity of an ionization chamber by a conductive coating 19 44.44.55

SOURCE: Atomnaya energiya, v. 19, no. 3, 1965, 309-311

TOPIC TAGS: ionization chamber, radiation dosimetry, fast neutron, gamma radiation, plastic coating 15

ABSTRACT: 15 The paper discusses the determination of the decrease, caused by a conductive plastic coating, in the energy evolved in the gas volume of a homogeneous ionization chamber (Fig. 1 of the Enclosure) as a function of the energy of fast neutrons, size of the gas volume, and thickness of the coating. On the basis of the calculations (Fig. 2) a plot is given for γ , the ratio of the energy evolved in the volume of a flat chamber with a conductive coating to the energy evolved in the volume of a rigorously homogeneous chamber versus the distance between the chamber walls (expressed in units of the path of protons of maximum energy). It is concluded that in constructing homogeneous ionization chambers, one must take into consideration a possible decrease of the doses absorbed due

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L 1925-66

ACCESSION NR: AP5023780

to the conductive coating. From the function γ , the error introduced by the conductive layer can be determined and the layer thickness which will give the smallest correction can be calculated. "The author thanks B. M. Isayev for reviewing the results and E. Kh. Papatsenko for assistance in the computations." Orig. art. has: 2 figures and 8 formulas. ^{7/55}

ASSOCIATION: none

SUBMITTED: 23Nov64

ENCL: 01

SUB CODE: NP, MT

NO REF SOV: 001

OTHER: 005

2/3

L-1925-66
ACCESSION NR: AP5023780

ENCLOSURE: 01

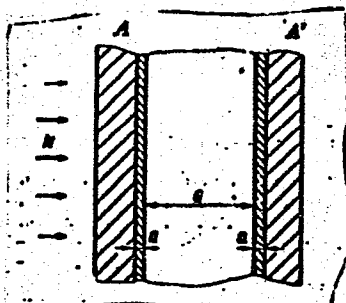


Figure 1. Diagram of flat ionization chamber with conductive coating.

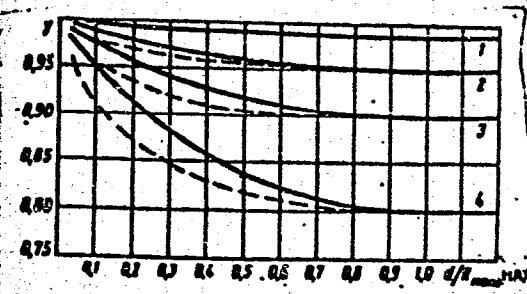


Figure 2. Dependence of Y on the size of the gas cavity, coating thickness, and path of recoil protons for various values of a/d : 1 - 0.01; 2 - 0.05; 3 - 0.1; 4 - 0.2; — directed neutron flux; ---- isotropic neutron flux.

mlr
3/3

L 10803-66 EWP(e)/EWT(m)/EWP(j)/EWP(h)/EWA(h)/EWA(l) WW/RM/WH
 ACC NR: AP5025928 SOURCE CODE: UR/0205/65/005/074/0751
 AUTHOR: Bregadze, Yu. I. 44.5
 ORG: Institute of Biological Physics, AN SSSR, Moscow (Institut biologicheskoy fiziki AN SSSR) 44.5
 TITLE: The use of ionization chambers for evaluating the mean energy of fast neutron spectra in radiobiological experiments
 SOURCE: Radiobiologiya, v. 5, no. 5, 1965, 744-751 44.5
 TOPIC TAGS: fast neutron, radiation biologic effect, relative biologic effect, ionization chamber, radiation dosimetry
 ABSTRACT: Using schematic diagrams, the author calculates: 1) the relationship between the wall and gas effects in a homogeneous chamber; 2) the mean energy of a fast neutron spectrum in the section of the IRT reactor where biological objects are irradiated, and 3) the selection of gas-cavity dimensions when constructing ionization chambers for fast neutron dosimetry. He concludes that by using graphite and polyethylene chambers containing CO₂ and ethylene, it is possible to measure the absorbed doses of fast neutrons and gamma rays in a combined flow and to evaluate the degrees of variation of the fast neutron spectrum. In this section of an IRT reactor, the fast neutron spectrum does not change significantly as it travels. In addition, the fast neutron spectrum does not vary when passing through a polyethylene layer up to
 Cord 1/2 UDC: 539.125.5:621.039.55 2

L 10803-66

ACC NR: AP5025928

7 cm thick. By determining the relationship between neutron energy and the wall and gas effect in a homogeneous chamber, it is possible to calculate the limitations of using air cavities for fast neutron dosimetry. Orig. art. has: 6 figures and 1 table. [CD]

SUB CODE: 06/18 SUBM DATE: 18Nov64/ ORIG REF: 002/ OTH REF: 002

Card

2/2

L 29837-66 EWT(m)

ACC NR: AP6012877

SOURCE CODE: UR/0205/66/006/002/0308/0311

AUTHOR: Bregadze, Yu. I.; Isayev, B. M.

ORG: Institute of Biological Physics, AN SSSR, Moscow (Institut biologicheskoy fiziki AN SSSR)

TITLE: Distribution of the absorbed dose of fast neutrons ¹⁹ in a heterogeneous phantom

SOURCE: Radiobiologiya, v. 6, no. 2, 1966, 308-311

TOPIC TAGS: ~~neutron radiation~~, radiation biologic effect, ~~neutron absorption~~, ~~fast neutron~~
tissue physiology, ~~x-radiation~~ MUSCLE PHYSIOLOGY, NEUTRON RADIATION,
NEUTRON ABSORPTION

ABSTRACT: In evaluating the effect of neutrons on biological systems, it is important to consider not only the mean tissue dose but also the different absorptive properties of different tissues such as bone, muscle, and fat. This is facilitated by a study of the absorption of neutrons in homogeneous models (phantoms) made of various substances (polyethylene, polystyrene, graphite), with particular attention to their C and H content. In an extension of this work, the authors determined the change in absorption with depth in a heterogeneous model made of layers of fat, muscle, and bone and subjected to x-irradia-

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UDC: 621.039.55

L 29837-66

ACC NR: AP6012877

tion or bombardment with fast neutrons. The results are shown in Fig. 1. Orig. art. has: 1 table, 2 figures, and 2 formulas. [08]

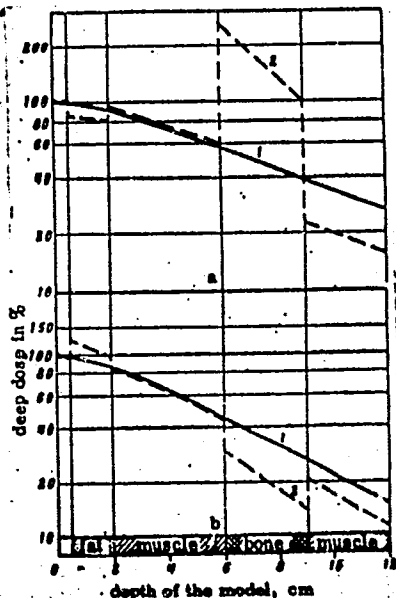


Fig. 1. Percent distribution of the deep dose in: 1) a homogeneous phantom made of muscle tissue, and 2) a heterogeneous phantom consisting of layers of fat, muscle, and bone

a - X-irradiation with $d_{1/2} = 1.5$ mm Cu, distance from the source = 150 cm, field of irradiation = 100 cm²; b - fast neutrons from a reactor.

SUB CODE: 06/ SUBM DATE: 14Jul65/ ORIG REF: 003/ OTH REF: 005/ ATD PRESS:5013
Card 2/2

ACC NR: AP7000130

SOURCE CODE: UR/0115/66/000/011/0020/0022

AUTHOR: Isayev, B. M.; Bregadze, Yu. I.; Korshikov, A. V.

ORG: none

TITLE: The units "ber" and "equivalent rad"

SOURCE: Izmeritel'naya tekhnika, no. 11, 1966, 20-22

TOPIC TAGS: ionizing radiation biologic effect, relative biologic efficiency, radiobiology, x ray radiation biologic effect, radiation shielding, radiation safety, radiation dosimetry

ABSTRACT: The authors answer the objections to GOST 8848-63, establishing standard units for radiological measurements, raised by M. F. Yudin [see AP7000128] and I. B. Keirim-Markus et al. [see AP7000129]. Since GOST 8848-63 permits use of the units rad and roentgen in addition to or instead of the official standard units joule/kg and coulomb/kg, there is no need to revise the GOST standard as suggested by Keirim-Markus. Elevation of ber and rem to the status of standard units is felt to be premature, in the absence of a standard scale or procedure for reproducing these units or calibrating instruments with them. Yudin's suggestions that the ICRU (International Commission on Radiological Units) term "dose equivalent" be replaced by a new term, "equivalent dose," is rejected as making a distinction where no difference exists, and as defeating the ICRU's efforts to reserve the noun "dose"

ACC NR: AP7000130

to denote "absorbed dose." There is likewise no need to invent a special new unit, the "equivalent rad," to express dose equivalent (Yudin's "equivalent dose"), since the units ber and rem already exist for this purpose. [DP]

SUB CODE: 18, 06/ SUBM DATE: 10Aug66/ ORIG REF: 003/ OTH REF: 001/
ATD PRESS: 5110

TRIGONOMETRIC, 5.

determining topographic points by linear measurement. p. 10

GEOMETRIC LIST vol. 10, no. 1/2, Jan./Feb. 1950

Yugoslavia

so. TAB. 3 FOREIGN AGRICULTURE LIST vol. 3, no. 10 Oct. 1950

CA BREGAN, A

10

Amino acids. V. Reaction of *N*-disubstituted glycol chlorides with diazomethane. A new synthesis of some α -alanine derivatives. K. Balenović, N. Briggant, D. Cerur, and M. Tkalčić (Univ. Zagreb, Yugoslavia). *J. Org. Chem.* 16, 1398-10(1951); cf. *C.A.* 45, 9479h.—Whereas *N*-monosubstituted glycol chlorides (I) and CH_2N_2 give oxazolones, *N,N*-disubstituted I, such as RCH_2COCl (II) ($\text{R} = o\text{-C}_6\text{H}_4(\text{CO})_2\text{N}$ throughout the abstr.), give $\text{RCH}_2\text{COCHN}_2$ (III). II, prepd. by refluxing 7 g. $\text{RCH}_2\text{CO}_2\text{H}$ with 12 cc. SOCl_2 1 hr., bp. 190-2°, m. 84-5°. Adding gradually 7.5 g. II in 500 cc. ether to CH_2N_2 from 30 g. $\text{MeN}(\text{NO})\text{CONH}_2$ in 500 cc. ether at 0° gives 75% III, m. 168° (decomp.). Heating 2.5 g. III in 30 cc. EtOH with 0.1 g. Ag_2O in 5 cc. EtOH gives 35% $\text{RCH}_2\text{CH}_2\text{CO}_2\text{Et}$, needles, m. 72-3°. Treating 4.6 g. III in 25 cc. AcOH with 5 cc. concd. HCl gives 87.5% $\text{RCH}_2\text{COCH}_2\text{Cl}$, m. 138°. Heating 6.9 g. III in 30 cc. EtOH at 60-70° and adding 25 cc. H_2O contg. 0.1 cc. concd. H_2SO_4 give 60% $\text{RCH}_2\text{COCH}_2\text{OH}$, m. 142°. Heating 3 g. III with 20 cc. AcOH at 50-60° gives 50.7% $\text{RCH}_2\text{COCH}_2\text{OAc}$, m. 135-6°. Refluxing 3 g. III in 100 cc. MeOH with 1.6 g. powd. CuO 4 hrs. gives 95% $\text{RCH}_2\text{COCH}_2\text{OMe}$, m. 89.5° (semicarbazone, m. 201°; 2,4-dinitrophenylhydrazone, m. 207°). Heating 3 g. III in 30 g. PhOH 2-3 hrs. at 0° gives 48% $\text{RCH}_2\text{COCH}_2\text{OPh}$, prisms, m. 150°. Refluxing 2.29 g. III and 2.29 g. picric acid in Me_2CO 0.5 hr. gives 44% $\text{RCH}_2\text{COCH}_2\text{OC}_6\text{H}_3(\text{NO}_2)_3$ (2,4,6), pale yellow needles, m. 207°. F. E. Brauns

1952

BREGANT, N.

Yugoslavia (430)

Science - Periodicals

Some halogen substituted carbocyanine dyes. p. 188
ARHIV ZA KEMIJU. (Hrvatsko kemijsko drustvo i
Seksija Kemicara Društva inženjera i tehnicara
Hrvatske) Zagreb. /Quarterly of the Croatian
Chemical Society and the Chemical Section of the

East European Accessions List. Library of Congress,
Vol. 2, No. 6, June 1951. Unclassified

"Card 1 of 2"

BREGANT, N.

Yugoslavia (430)

(continued) Croatian Society of Engineers and Technicians. Some articles written in English or German. Summaries in English or other western languages/. Vol. 23, no. 3/4, 1951

East European Accessions List. Library of Congress, Vol.2, No. 6, June 1951, Unclassified

"Card 2 of 2"

BREGANT, N.

Yugoslavia (430)

Science - Periodicals

Synthesis of a 1,3-dioxo-isoindoline carbocyanine dye
p 192 ARHIV ZA KEMIJU. (Hrvatsko kemijsko drustvo i
Sekcija kemicara Društva inženjera i tehnicara
Hrvatske) Zagreb. /Quarterly of the Croatian Chemical
Society and the Chemical Section of the Croatian

East European Accessions List. Library of Congress,
Vol. 2, No. 6, June 1953, Unclassified

"Card 1 of 2"

BREGANT, N.

Yugoslavia (430)

(continued) Society of Engineers and Technicians.
Some articles written in English or German. Summaries
in English or other western languages/. Vol. 23,
no. 3/4, 1951

East European Accessions List. Library of Congress.
Vol 2, No. 6, June 1953, Unclassified.

"Card 2 of 2"

Some halogen-substituted carbocyanine dyes. N. Bregant (Univ. Zagreb). *Abstr. Chem.* 23, 182-91(1962) and summary. cf. following abstr. The reaction product of $\text{PhNH}_2 \cdot \text{HCl}$ and S_2Cl_2 (Ger. 300,600; 287,344; C.A. 18, 991) was made alk. and treated with Ac_2O and Na 2-amino-6-chlorothiophenol according to the method of Beilenson and Hamer (C.A. 30, 7573^a) to yield 6-chloro-2-methylbenzothiazole (I). I and EtI gave 6-chloro-2-methyl-3-ethylbenzothiazolium iodide (II), m. 235° (from MeOH) (yield 60%). II (13.4 g., 0.04 mole) was dissolved in 100 cc. dry $\text{C}_6\text{H}_5\text{N}$ at 100° and cooled to 60°. To this soln. was added 6.2 g. (0.08 mole) AcCl during 15 min. The anhyd. mixt. was refluxed 12 hrs. at 100-10°, the $\text{C}_6\text{H}_5\text{N}$ removed by vacuum distn., and the residue suspended in 80 cc. water, made alk. with K_2CO_3 , and extd. with ether. The ext. was dried over K_2CO_3 , the ether removed by vacuum distn., and the residue recrystd. from EtOH to yield 40.3% 2-(acetylmethylene)-3-ethyl-6-chlorobenzothiazole (III), m. 147°. III (2.48 g.) was refluxed 1 hr. at 160° with 3 g. 2-methyl-3-ethylbenzothiazolium iodide. After cooling the product was filtered, washed with ether, dried at 90°, and recrystd. from MeOH to yield 16.3% of the dye 6-chloro-3,3'-diethyl-9-methylthiacarbocyanine iodide (IV), m. 284°. Equiv. amts. of I and $p\text{-MeC}_6\text{H}_4\text{SO}_3\text{Me}$ were heated 6 hrs. in a sealed tube at 120° to yield 6-chloro-2-methyl-3-ethylbenzothiazolium p -toluenesulfonate (V). A 15% soln. of V in anhyd. $\text{C}_6\text{H}_5\text{N}$ was refluxed 1 hr. with 2 moles Et orthoacetate. While hot the mixt. was treated with twice its vol. 40% aq. NH_4Br . This mixt. was poured into 10 times its vol. of water, allowed to stand 12 hrs. at 0°, and the ppt. filtered, dried, and recrystd. from MeOH to yield 15% 6,6'-dichloro-3,3'-diethyl-9-methylthiacarbocyanine bromide (VI), m. 265°. The absorption spectra of IV and VI gave nearly parallel curves with absorption max. at 645 and 550 m μ , resp., the extinction coeffs., $\log \epsilon$, being 3.4 and 3.2, resp., at concns. of 0.25 mg./100 g. soln. in 96% EtOH.

C. S. Shapiro

MAF.

② 7.

Synthesis of a new 1,3-dioxoisindoline carbocyanine dye.
 V. Bregant (Univ. Zagreb), *Acta Chem. 25*, 182-4 (1962).
 English summary. Cf. preceding abstr.—1-Chloro-3-phthalimido-2-propanone (I) was prepd. by the method of Gabriel and Gile (C.A. 12, 687). I (4.64 g., 0.02 mole) in 30 cc. abs. EtOH was refluxed 3 hrs. with 1.3 g. (0.02 mole) thioacetamide, cooled, poured into 300 cc. aq. NaHCO₃, filtered, washed with water, and dried to yield 78% 2-methyl-4-(phthalimidomethyl)thiazole (II), prisms, m. 148° (from abs. EtOH). EtI (4.5 g., 0.0305 mole) was heated 8 hrs. with 3.4 g. (0.0132 mole) II in a sealed tube at 120°, the product boiled in petr. ether, and recrystd. from abs. EtOH to yield 85% 2-methyl-4-(phthalimidomethyl)-3-ethylthiazolium iodide (III), m. 200°. III (2 g., 0.0028 mole) was refluxed 10 min. with 30 cc. anhyd., freshly-distd. C₂H₅N, 4 cc. CH(OEt)₂ added, refluxed 1 hr. at 160° with occasional shaking, cooled, poured into 250 cc. cold water, and allowed to stand overnight at 0° to yield 12% bis-2-[4-(phthalimidomethyl)-3-ethylthiazole]trimethinecyanine iodide (IV), dark-violet prisms, m. 241° (from abs. EtOH). The absorption max. of IV is at 545 with an extinction coeff. log ϵ = 3.4 at a concn. of 0.25 mg./100 g. soln. in 96% EtOH.
 C. S. Shapiro.

UREGANT, N.

6

Amino acids. X. Some derivatives of optically active α -amino aldehydes. K. Bakenovic, N. Bregant, D. Cesar, D. Vuk, and L. Jambresic (Univ. Zagreb, Yugoslavia). *J. Org. Chem.* 18, 247-252 (1953); *cf. C.A.B.* 47, 8619k. A Rosenmund-Zetsche reduction of about 15 g. α -phthalimidoacetyl chloride in xylene at 110-130° with 5% Pd-BaSO₄ and 80-90% of 1:2 conc. HCl was evolved, washing the next with Et₂O, evap. of the Et₂O from the filtrate, and cooling the xylene soln. at 0°, gave above 60% α -phthalimidoaldehyde (II). Addn. of 0.01 mole NH₄Cl to 1 mole I and 1.1 mole HClOEt₂ in the min. amt. abs. EtOH, diln., after 5 days at 20°, with H₂O and a little NH₃, and Et₂O extr. gave the di-Et acetal. Keeping 1 mole I, 1.1 moles (CH₃)₂SO, and 1.0 vols. dioxane contr. 3% dry HCl at 20° for 4 days, even in vacuo at 40°, addg. H₂O, and reconc. gave the ethylene acetal, which was crystd. from MeOH. *N,N*-phthaloyl-L-cysteine aldehyde (65% yield) m. 112°, $[\alpha]_D^{20} = -29.0$ (c 1.6, 2% C₆H₆); sublimation at 95-100°/0.04 mm. for 1 hr. gave partial racemization; semicarbazone, m. 226°; 2,4-dinitrophenylhydrazine, m. 203-4°; di-Et acetal (78%), m. 53°, $[\alpha]_D^{20} = -2.7 \pm 0.3$ (c 3.7 EtOH); ethylene mercaptal, m. 90° (racemate, 25% yield obtained from cold MeOH) (distn. of the mother liquor at 160-70°/0.03 mm. gave 70% active oil, $[\alpha]_D^{20} 48.7 \pm 0.4$ (c 2.16 C₆H₆)). *S*-Benzyl-N-phthaloyl-L-cysteine aldehyde (67%) m.

7-26-54

110-20°, $[\alpha]_D^{25}$ $-5.0 \pm 0.5^\circ$; distn. at 180°/0.03 mm. gave partial racemization; semicarbazone, m. 205-0.5°; di-Et acetal (97%), m. 73°, b.p. 200-20°, $[\alpha]_D^{25}$ $-4.7 \pm 1.4^\circ$ (c 1.5 CH₂Cl₂); ethylene mercaptal (72.3%), m. 98-100°, b.p. 230°, $[\alpha]_D^{25}$ $-60.14^\circ \pm 1^\circ$ (C₆H₆). O-Methyl-N-phthaloyl tyrosine aldehyde (100%) m. 88°, $[\alpha]_D^{25}$ $-150 \pm 1^\circ$ (c 0, EtOH); semicarbazone, m. 227-0°, di-Et acetal (81%), b.p. 160°, $[\alpha]_D^{25}$ $-108^\circ \pm 0.4^\circ$ (c 2.36 Et₂O) (distn. did not change the $[\alpha]$); ethylene mercaptal (89%), m. 103°, $[\alpha]_D^{25}$ $-105 \pm 0.8^\circ$ (c 0.18 CH₂Cl₂). Refluxing the acetal with 1 mole NaH₂PO₄ in EtOH for 30 min. removed the N,N-phthaloyl group as the insol. hydrazide (II) and concn. in vacuo of the filtrate gave the following compds. The mercaptals were similarly treated for 4 hrs., N HCl added to the mixt., and the mixt. kept at 0° to give more II; the filtrate treated with excess NH₄OH and extd. with Et₂O. L-Alanine aldehyde di-Et acetal (36%) b.p. 95-105° (bath temp.), $[\alpha]_D^{25}$ $17.8 \pm 0.3^\circ$ (c 1.32, N HCl); ethylene mercaptal (67%), b.p. 145-55°, $[\alpha]_D^{25}$ $18.5 \pm 0.2^\circ$ (c 1.98 CH₂Cl₂); S-Benzyl-L-cysteine aldehyde di-Et acetal (84%), b.p. 135-10°, $[\alpha]_D^{25}$ $-2.0 \pm 0.2^\circ$ (c 2.49 CH₂Cl₂); ethylene mercaptal, b.p. 150-80°, $[\alpha]_D^{25}$ $-10.2 \pm 1^\circ$ (c 0.924 C₆H₆). O-Methyl-L-tyrosine aldehyde di-Et acetal (80.5%) after purification on an Al₂O₃ column, b.p. 160°, $[\alpha]_D^{25}$ $-79.2 \pm 0.1^\circ$ (c 0.73 CHCl₃).

John W. Green

The muscarine series. II
and their muscarinic activity.
of acetate. K. Baković,
Zagreb, Yugoslavia.
(English).—Referring to:
 $\text{HOCH}_2\text{CH}(\text{CHMe})\text{O}$ (I)
0.9 ml. C₆H₆, during 7 hrs., with a total condensation taking
the form of mist, with the removal of H₂O distill., washing
with water, with HCl and NaOH, to dryness gave 3.6 g.
 $\text{COCH}_2\text{CH}(\text{CHMe})\text{OCOR}$ (II), m.
Acetals of bistrane aldehyde
and their muscarinic activity.
N. Braganj, and T. Cabian
Paris 208-78, 223-71957.

118, 202.

118-29°; analytical sample, m. 136-40° (from CH_2Cl_2 pet. ether (I:1). In the same manner 0.45 g. 1:12.0 g. PhCH_2OH , and 0.4 g. II gave 19 g. crude $\alpha\text{-C}_6\text{H}_4(\text{CO})\text{NCH}_2\text{CH}(\text{OCH}_2\text{Ph})_2$ (IV), m. 95-101°; analytical sample, m. 103-9° (from CH_2Cl_2 pet. ether (1:1)). Analytical sample, refluxed 3 hrs. with 60 ml. N NaOH , 11.0 g. in EtOH and 80 ml. EtOH, cooled, the phthalic anhydride (V) filtered off, CH_2Cl_2 added to the filtrate and added V filtered off giving a total of 78% V. Distn. of the filtrate gave 2.0 g. $\text{H}_2\text{NCH}_2\text{CH}(\text{OCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{O})_2$ (VI), bp. 57-70°/1 mm. picrate, m.

109° (from MeOH). IV (10.4 g.) treated in the same manner with 200 ml. M NaOH, H₂O soln. in EtOH and 200 ml. EtOH, gave 10.8 g. crude $NaCH_2CH(OC(=O)Ph)_2$ (VII), b.p. 110-12°; picrate, m. 123-4° (from EtOAc-petl. ether). VI (1.3 g.) 1.0 g. MeI, 0.7 g. NaOH, and 3 ml. EtOH refluxed 3 hrs., cooled, 0.7 g. powdered NaOH added and shaken until dissolved, 1.0 g. MeI added, refluxed 2 hrs., the same procedure repeated twice, cooled and let stand overnight yielded 3.2 g. $1Ms$ $NaCH_2CH(OC(=O)Ph)_2$.

2

YUGOSLAVIA/Organic Chemistry - Naturally Occuring Substances
and Their Synthetic Analogs

E-3

Abs Jour : Referat Zhur - Khimiya, No 2, 1957, 4433
Author : Balenovic, K., Eregant, N., Gaspert, B., Jambresic, I.,
Tomasic, V.
Title : Some Perivatives of L-Cysteine Aldehyde. An Improved
Preparation of S-Benzyl-N-Phthaloyl-L-Cysteine. Amino
Acids. XXXI.
Orig Pub : Arhiv kemiju, 1955, 27, No 4, 207-210
Abstract : A method has been worked out for the preparation of opti-
cally active S-benzyl-N-phthaloyl-L-cystein (I), which
has been converted into S-benzyl-N-phthaloyl-L-cystineal-
dehyde (II); a number of derivatives of II have been
prepared. Mixture of finely comminuted S-benzyl-L-cys-
tein (0.033 mole, $[\alpha]_D^{25} + 28^\circ$) and phthalic anhydride
(0.035 mole) heated (bath temperature 130-135°) while
stirring, for 30 minutes, dissolved in C_6H_6 and from

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YUGOSLAVIA/Organic Chemistry - Naturally Occuring Substances
and Their Synthetic Analogs

E-3

Abs Jour : Referat Zhur - Khimiya, No 2, 1957, 4563

filtrate I was precipitated with petroleum ether, total
yield 90%, MP 108°, $[\alpha]_D^{25} -167 \pm 0.1^\circ$ (c 0.56; CH₂OH).
From I of $[\alpha]_D -150^\circ$ was prepared the acid chloride,
 $[\alpha]_D^{16} -136^\circ$ (c 1.44; benzene), which by reduction
over 5% Pd/BaSO₄, 10 hours at 120-125° (bath temperature)
was converted to II, yield 97%, $[\alpha]_D^{17} -103^\circ$ (c 1.2;
benzene). By boiling for 5 hours 0.01 mole II
($[\alpha]_D -102^\circ$), 2.5 ml ethylene glycol and 0.1 g p-toluen
sulfonic acid in 150 ml C₆H₆ and evaporating the reac-
tion mixture, was obtained ethylene acetal of II,
yield 97%, after chromatography on Al₂O₃, MP 95-97°
(from CH₂Cl₂ + petroleum ether),
 $[\alpha]_D^{12} -78 \pm 0.5^\circ$ (c 2.8; benzene). By boiling of ethy-
lene acetal of II with hydrazine hydrate in alcohol (3
hours) was obtained ethylene acetal-S benzyl-L-cystein,

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Optically active amino aldehydes. II. Preparation of cyclic acetals of quaternary amino aldehydes. Contribution to the knowledge of the stereospecificity of muscarinic activity. K. Balenović, N. Brečani, T. Galun, Z. Stefanac and V. Skarić (Univ. Zagreb, Yugoslavia). *J. Org. Chem.* 21, 115-18 (1956); cf. *C.A.B.* 48, 1958b; 50, 3319a. —Cyclic

acetals $RCH(NH_2)CH_2OCH_2CH_2O$ are prep'd. from the corresponding NH_2 acids or from the tetrahydroimidazole derivs. and are converted into their quaternary NH_4 salts. Condensation of $o-C_6H_4(CO)NCH_2CH_2CHO$ with $(CH_3)_2NPh$ gives 1,3-diphenyl-2-(2-phthalimidoethyl)tetrahydroimidazole (I), needles, m. 148°. Slowly distg. 6.1 g. *N*-phthaloyl-L-alanine aldehyde, $[\alpha]_D^{20} -26^\circ$, 7.5 cc. $(CH_2OH)_2$, 0.2 g. $p-MeC_6H_4SO_3H$, and 300 cc. C_6H_6 5 hrs. with simultaneous removal of 1.2 cc. H_2O , and evapg. the washed and dried C_6H_6 soln. give 98% *N*-phthaloyl-L-alanine aldehyde ethylene acetal (II). Slowly distg. 20 g. I, 12.5 cc. $(CH_2OH)_2$, 15.8 g. $PhSO_3H$ in 900 cc. C_6H_6 and 10 cc. H_2O 8 hrs. with simultaneous removal of the H_2O and evapg. the washed and dried C_6H_6 soln. give 100% β -phthalimidopropionaldehyde ethylene acetal (III), needles, m. 113-15°. Refluxing 8 g. III with 75 cc. alc. of $N_2H_4 \cdot H_2O$ and 60 cc. EtOH 3 hrs. adding CH_2Cl_2 to the filtered soln., and evapg. the again filtered soln. give β -aminopropionaldehyde ethylene acetal, m. 70-72°. Treating β -alanine aldehyde ethylene acetal with MeI according to Fischer [Ber. 26, 404 (1893)] gives

30.7% (1-formylethyl)dimethylammonium iodide ethylene
 acetal (IV); 2-formylethyl analog, prep. similarly from H-
 $\text{NCH}_2\text{CH}_2\text{CHO}$ ethylene acetal in 88% yield, platelets, m.
 235°. The following addnl. NH_2 derivs. are prep.: α -
 phthalimidovalerylaldehyde, 82%, m. 106-8°; N-phthaloyl-
 DL-valine aldehyde, 61%, prisms, m. 60°; L-isomer, 95%,
 pale yellow oil, $[\alpha]_D^{25} -47.3^\circ \pm 1^\circ$ (c 5.4, C_6H_5); semicarba-
 zone, needles, m. 223°; 2,4-dinitrophenylhydrazones, yellow
 needles, m. 133-4°; tetrahydroimidazole deriv., yellow
 needles, m. 130-1°; $[\alpha]_D^{25} -29.1^\circ \pm 0.6^\circ$ (c 0.55, C_6H_5);
 N-phthaloyl-DL-leucine aldehyde, 87%, m. 60°; L-isomer,
 50%, pale yellow oil, $[\alpha]_D^{25} -40.2^\circ \pm 2^\circ$ (c 5.17, C_6H_5);
 semicarbazone, needles, m. 182-3°; 2,4-dinitrophenylhy-
 drazone, yellow needles, m. 165-7°; diethyl acetal, pale yellow
 oil, b.p. 130-5°, $[\alpha]_D^{25} -15.2^\circ \pm 0.3^\circ$ (c 3.62, C_6H_5); O-
 methyl-N-phthaloyl-DL-serine aldehyde, 49%, pale yellow oil
 (tetrahydroimidazole deriv., yellow needles, m. 154.5°); O-
 Et homolog, 28.4%, pale yellow oil (semicarbazone, prisms,
 m. 190.6°). The amino acetals (a) derived from the follow-
 ing NH_2 acids are prep. from their corresponding N-phthal-
 oyl derivs. (b), and the picrates (c) and quaternary methu-
 dates (d) of a are prep.: L-alanine, a, b, 65-70°, $[\alpha]_D^{25}$
 $16.3^\circ \pm 1.1^\circ$ (c 1.32, 0.1N HCl), b (II), m. 93°, $[\alpha]_D^{25} 23^\circ \pm$
 0.2° (c 2.5, C_6H_5), c, yellow prisms, m. 207°, d, needles,
 m. 221-2°, $[\alpha]_D^{25} -15.2^\circ \pm 0.4^\circ$ (c 1.22, H₂O); D-alanine
 a, b, 65-70°, $[\alpha]_D^{25} -15.9^\circ \pm 0.3^\circ$ (c 1.59, 0.1N HCl), b,
 prisms, m. 95°, $[\alpha]_D^{25} -21^\circ \pm 0.3^\circ$ (c 2.85, C_6H_5), c, yellow
 prisms, m. 210°, d, needles, m. 219-20°, $[\alpha]_D^{25} 14.1^\circ \pm$
 0.2° (c 1.03, H₂O); DL- α -aminobutyric acid, a, b, 70-1°,
 m. 60-2°, c, yellow needles, m. 201°, d, needles, m. 187°;
 DL-valine, a, b, 80-5°, b, prisms, m. 81°, c, yellow needles,
 m. 181°, d, needles, m. 161-1°; L-valine, a, —, b, prisms,
 m. 30°, $[\alpha]_D^{25} -4.7^\circ \pm 0.1^\circ$ (c 7.07, C_6H_5), c, yellow needles.

Balanine, K. Bryant, N. Calijan, T.
 m, 180°, d, needles, m. 181-3°, $[\alpha]_D^{25} 10.6^\circ \pm 0.8^\circ$ (c 2.37, H₂O); m-leucine, a, b, 75-80°, d, yellow oil, b.p. 125-130°, c, yellow needles, m. 169-70°, d, needles, m. 171-2°, methyl-m-serine, a, b, c, yellow needles, m. 211-2°, needles, m. 181-2°, O-ethyl-m-serine, a, b, 65-70°, b.p. 126-30°, platelets, m. 54°, c, yellow needles, m. 171-2°, d, prisms, m. 144°. The results of the muscarinic activity of *d* carried out according to Kael, et al. (C. J. 20, 8, 1954) given in a table.

*RM
MM*

7
 (+)-3-Aminobutyric acid. Correlation of its configura-
 tion with that of α -amino acids. K. Balanovic, N. Bregant,
 and D. Corat (Kemicki Inst., Zagreb, Yugoslavia). *J.*
Chem. Soc. 1958, 3082-4. Direct stereo correlation of the
 configuration of (+)-H₂NCHMeCH₂CO₂H (I) with that of
 1-H₂NCHEtCO₂H (II) was given. I was converted to (+)-
 2-C₆H₅(CO)₂NCHMeCH₂CHO (III) and its ethylene mer-
 captal (IV). Analogous reactions were applied to the
 prepns. of 1-2-C₆H₅(CO)₂NCHEtCHO (V) and its ethylene
 mercaptal (VI) prepd. from II. Desulfurization of IV and
 VI gave the pinhepts undeccribed (+)- (VII) and (+)-
 phthalimidebutane (VIII). Me (+)-3-phthalimidebutane
 (3.2 g.) in AcOH treated with 35 cc. 40% NaOH at 40-50°
 yielded 2.4 g. (+)-3-phthalimidebutane IX, b.p. 80°, m.
 80° (from C₆H₆), [α]_D²⁰ 43° (c 1.0, C₆H₆).
 at room temp. overnight with 5% NaOH in C₆H₆ gave
 (+)-3-phthalimidebutane (X), m. 92° (from C₆H₆), b.p. 80°
 (c 0.43, C₆H₆). X (4.2 g.) in 20% NaOH in C₆H₆ at
 BaCO₃ at 110-15° so that 0.7 mole H was taken up in 7
 hrs. gave 1.8 g. III, sublimed at 110° 0.215 mm. of crystal
 m. 113° (from C₆H₆-ligroine), [α]_D²⁰ 68° (c 0.52, C₆H₆). III
 (0.9 g.) and 0.5 g. (C₆H₅SH)₂ left 3 days in 5% anhyd. HCl-
 dioxane at room temp. yielded 0.9 g. of IV as a clear oil,
 b.p. 120°, [α]_D²⁰ 41°. IV (0.5 g.) in 15 cc. Me₂CO refluxed
 with 7 g. Raney Ni (W-1) 7 hrs. gave 0.3 g. VII, b.p. 60°, m.
 35-5°, [α]_D²⁰ 34° (c 1.43, C₆H₆). II (0.06 mole) and 0.03
 mole 2-C₆H₅(CO)₂O heated 2 hrs. at 110° gave (+)-3-
 phthalimidebutyric acid (XI), m. 73-5° (c 0.52, C₆H₆).

BREGANT, N.

UUGOSLAVIA/Organic Chemistry- Synthetic Organic Chemistry

E-2

Abs Jour : Referat Zhur - Khimiya, No 2, 1957, 4363

Author : Balenovic, K., Bregant, N.

Title : A Route for the Synthesis of Substituted Dioxene Derivatives

Orig Pub : Croat. Chem. acta, 1956, 28, No 1, 67-68

Abstract : A new procedure for the synthesis of substituted 1,4-dioxene has been worked out using 3-phthalimidomethyl-1,4-dioxene-2 (I) as an example. A suspension of 0.02 mole 1-diazo-3-phthalimidopropanone in 20 ml ethyleneglycol and 0.1 mole of BF_3 etherate is heated at $50-60^\circ$ and after 0.5 hour it is poured into a tenfold amount of water, allowed to stand for 12 hours at 0° , and thus there is obtained 1-(2'-hydroxyethoxy)-3-phthalimidopropanone (II), yield 63%, MP $132-135^\circ$ (after chromatography on Al_2O_3). A solution of 1 g II in 40 ml C_6H_6 is shaken with 2 g P_2O_5 for 24 hours at $18-20^\circ$, filtered and evaporated to get I, yield 83%, MP $164-165^\circ$ (from CH_2Cl_2 -petroleum ether).
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Further characterization and isolation studies in the muscarine series: K. Balenović, N. Dugan, and J. Stokich (Univ. Zagreb, Yugoslavia). *Croat. Chem. Acta* 38: 1057 (1967) (in English).—Dowex 50 X 8 resin, 200 g. (230 g.) was placed in a column (1.7 X 52 cm.) and eluted in turn with 3N HCl, H₂O, 2N NaOH, and 1.5N HCl with 1.5N HCl during 48 hrs. at a flow rate of 2 ml./hr. The mixt. of bases (20 mg.) prepd. according to Balenović, et al. (C.A. 50, 10344), was dissolved in 20 ml. H₂O, passed through the column, eluted with 2.5N HCl, and the fractions showing the muscarinic activity (100-2500 units/mg.) were evapd. and showed *R_f* values 0.24 and 0.13. Muscarine

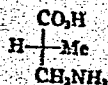
(I) chloride (34.3 mg.) prepd. from chloraurate (cf. Dudley, C.A. 24, 1083) dissolved in 4 ml. H₂O, acidified with AcOH, treated with 0.13f aq. (Ph₄N)Na soln., kept 24 hrs. at 0°, the ppt. filtered off, washed with few drops of AcOH, and dried *in vacuo* at room temp. yielded 60 mg. I tetraphenylborate, m. 172-3° (from 1:1 Me₂CO-H₂O); infrared spectra showed the presence of OH group at 3424 cm.⁻¹. Detn. according to Stodola (C.A. 32, 2460) gave the value corresponding to 1 OH group in I tetraphenylborate and choline tetraphenylborate.

D. Stokich

May

Distr: 4E3d/4E2c(j)

Correlation of the configurations of $(-)$ - α -methyl- β -alanine and $(-)$ -2-methylbutanol. K. Balenović and N. Bregant (Univ. Zagreb, Yugoslavia). *Chem. & Ind. (London)* 1957, 1273. Resolution of the *N,N*-phthaloyl deriv. of di- α -methyl- β -alanine by fractional crystn. of the brucine salts gave $(+)$ and $(-)$ (I) α -methyl- β -phthalimidopropionic acids, $[\alpha]_D^{25} +23^\circ$ and -23° , resp. Hydrolysis of I with HI and HOAc gave $(-)$ - α -methyl- β -alanine (II), $[\alpha]_D^{25} -14^\circ$ (H₂O), m. 173-5° (cf. C.A. 45, 7177a). I was converted into α -methyl- β -phthalimidopropionyl chloride, then to $(-)$ -1-diazo-3-methyl-4-phthalimido-2-butanone (III), $[\alpha]_D^{25} -72^\circ$ (EtOAc). III with HI in CHCl₃ at 0° (C.A. 37, 5700^g) gave $(+)$ -2-methyl-1-phthalimido-3-butanone (IV), $[\alpha]_D^{25} 10^\circ$ (CH₂Cl₂). Mixing IV, (CH₃SH)₂ and BF₃-Et₂O in Et₂O at -20° and keeping at -20° for 1 hr. and at room temp. for 4 days gave the mercaptal deriv., $[\alpha]_D^{25} 14^\circ$ (C₆H₆), which on reducing with Raney Ni in Me₂CO gave $(+)$ -2-methyl-1-phthalimidobutane (V), $[\alpha]_D^{25} 24^\circ$ (C₆H₆), identical with the compd. obtained from $(-)$ -2-methylbutanol [W. Marckwald, *Ber.* 37, 1038(1904)]. Therefore, the configuration of II is



Herbert G. Cantow

N. BREGANT

Absolute configuration of α -methyl- β -alanine. K. Ba-
lenović and N. Bregant (Univ. Zagreb, Yugoslavia).
Tetrahedron 5, 447 (1974). Cf. C.A. 52, 4495d. — Correla-
tion of the configuration of (+)- α -methyl- β -alanine (I)
and (-)-2-methylbutanal (II) was effected by conversion
of I into the known (+)-2-methyl-1-phthalimidobutane
(III) [cf. Marckwald, *Ber.* 37, 1038 (1904)]. Finely powd.
($\pm$)- α -methyl- β -alanine (prepd. from 7 g. $\text{H}_2\text{NCH}_2\text{CO}_2\text{H}$)
and 11 g. $\alpha\text{-C}_6\text{H}_5(\text{CO})_2\text{O}$ heated 1 hr. at 110° (oil bath),
the cooled mixt. recrystd. (1:3 alc.-water), the product re-
crystd., and dried at $60^\circ/0.01$ mm. gave 13 g. ($\pm$)- α -methyl-
 β -phthalimidopropionic acid (IV); m. 161° . IV (23.3 g.) in
400 ml. 96% alc. and 48.6 g. brucine in 250 ml. alc. evapd.
in *vacuo*, the crude salt (67 g.). [α]_D²⁰ -26.8° (c 1.00, CHCl_3).
taken up in 1000 ml. warm EtOAc, the filtered soln. dild.
with 200 ml. petr. ether and kept overnight at 0° , filtered,
and the yellow crystals [51 g., [α]_D²⁰ -23.4° (c 1.5, CHCl_3)]
repeatedly crystd. (EtOAc-petr. ether) gave the difficultly-
sol. brucine salt (V), [α]_D²⁰ -44.2°. Fractional crystn. gave
the more sol. diastereomer. V (11.4 g.) in 500 ml. water
and 250 ml. 4N-HCl kept 1 hr. at room temp. and filtered,
the cryst. product thoroughly washed with water, and dried
yielded 3.5 g. (-)- α -methyl- β -phthalimidopropionic acid
(VI), [α]_D²⁰ -11.3° (c 1.80, CHCl_3). The filtrate and wash-
ings extd. 3 times with 100 ml. C_6H_6 and the extd. evapd.
in *vacuo* yielded 0.48 g. impure VI, [α]_D²⁰ -24°. VI (3.5 g.)
[α]_D²⁰ -11° fractionally crystd. (1:1 alc.- H_2O) to give 0.9
g. racemic VI, the filtrates worked up, and the optically pure
VI (0.9 g., [α]_D²⁰ -20.1°) sublimed at 110 - $15^\circ/0.001$ mm.
(0.93 g.) in 16 ml. AcOH and 4 ml. 47% HI refluxed 8 hrs.,
the acids evapd. in *vacuo* and the residue taken up in water,
the residue on filtration washed with water, and the filtrate
extd. with H_2O , the aq. layer evapd. and soln. in water
and evapd. repeated until no trace of HI remained, the pale
yellow HI salt (m. 400 ml. water and filtered through

a column of 10 g. IR-4B Amberlite resin, eluted with 0.50
ml. water and the filtrate evapd. in *vacuo*, the residue taken
up in water and the soln. decolorized (C), the filtered soln.
evapd., and the cryst. product (0.4 g.) sublimed at $110^\circ/$
0.001 mm. gave I, m. 173 - 5° , [α]_D²⁰ -14.2° (c 0.42, C_6H_6).
VI (1.09 g., [α]_D²⁰ -18°) and 8.6 ml. SOCl_2 refluxed 1.5 hrs.
(oil bath, 70°), excess SOCl_2 evapd. in *vacuo*, the residue
taken up in C_6H_6 and the soln. evapd., the chloride (1.06 g.)
in 6 ml. C_6H_6 kept 6 hrs. at 0° with CH_3N_3 (from 17 g. Me-
(NO)NCONH₂) and the filtered soln. evapd. in *vacuo*, the
residue (1.1 g.) crystd., and the product [m. 113 - 14° , [α]_D²⁰
 70° (c 2.345, AcOEt)] recrystd. (EtOAc-petr. ether) gave
pure (-)-1-diazo-3-methyl-4-phthalimidobutan-3-one (VII),
m. 119° , racemizing readily on heating or prolonged stand-
ing in org. solvents. VII (0.32 g.) stirred at 0° in 3.5 ml.
 CHCl_3 with 1.6 ml. 47% HI, the mixt. kept 5 min. at -5°
and dild. with 8 ml. cold 5:3 H_2O - CHCl_3 , the CHCl_3 layer
shaken with 10 ml. cold water and 1 ml. Hg and the color-
less CHCl_3 layer treated with C, the filtered soln. evapd. in
vacuo and the residue recrystd. (CH_2Cl_2), sublimed at $70^\circ/$
0.001 mm., and recrystd. (CH_2Cl_2) gave pure (+)-2-methyl-
1-phthalimidobutan-3-one (VIII), m. 82° , [α]_D²⁰ 9.5° (c 0.61,
 CH_2Cl_2). VIII (0.02 g.) in 14 ml. Et_2O and 14 ml. (CH_3 -
 SH) at -20° treated with 4 ml. BF_3 - Et_2O complex in 20
ml. Et_2O , the mixt. kept 1 hr. at -20° and 4 days at room
temp., the Et_2O soln. washed with water and evapd., the
residue dried at $20^\circ/0.01$ mm., the cryst. residue (1.25 g.,
[α]_D²⁰ 7°) recrystd. (C_6H_6 -petr. ether), and sublimed at $120^\circ/$
0.01 mm. gave (+)-2-methyl-1-phthalimidobutan-3-one ethyl-
ene mercaptole, $\text{C}_{11}\text{H}_{15}\text{NO}_2\text{S}$, m. 128 - 8° , [α]_D²⁰ 14° (c 0.93,
 C_6H_6). The mercaptole (0.6 g.) refluxed 7 hrs. with stirring
in 80 ml. Me_2CO over 7 g. Raney-Ni W-1 and the residue on
filtration washed with Me_2CO , the filtrates evapd. in *vacuo*,
and the pale yellow oil (0.32 g., [α]_D²⁰ -2.5°) redistd. at
 $60^\circ/0.001$ mm. gave pure III, [α]_D²⁰ 24° (c 0.60, C_6H_6).
C. R. Addinall

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IC 17G76

USSR/Financial System 4901.0300 (Contd) Nov 1947

and enables continuous rise in their material and cultural level; whereas financial system of capitalist countries serves to carry out their militaristic policies, USSR financial system works for peace and economic and cultural progress.

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L 43997-65 EWT(m) Feb DIAAP

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AUTHORS: Makhlis, F. A.; Brager, A. Kh.

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B

TITLE: Investigation of gamma-radiation propagation in substances by the method of similarity theory

SOURCE: Inzhenerno-fizicheskiy zhurnal, v. 8, no. 4, 1965, 516-522

TOPIC TAGS: gamma radiation, similarity theory, similarity analysis, radiation absorption, radiation flux, differential cross section

ABSTRACT: The basic principles underlying the application of similarity theory to the problem of gamma-radiation propagation in substances are discussed. Starting with the kinetic equation of γ -radiation propagation, such similarity criteria are selected μr , μ_a/μ , Sr/N , E/E_0 , d/r , so that a given function representing some characteristics of the problem can be represented by $\Phi_i = \Phi(\mu r, \mu_a/\mu, Sr/N, E/E_0, d/r)$. For complete similarity, all three conditions (geometrical, physical, and boundary) must be satisfied. As a physical similarity criterion the identity $\mu_a/\mu = \text{idem}$ must be met. This is easily attainable if the system possesses the same effective atomic number. For radiation energies E slightly different from the amount reaching the irradiated substance (because of absorption), the above identity can only hold

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approximately, and the error introduced increases as the energy level increases.

For this purpose, a corrective multiplier $\xi = \xi \left[\left(\frac{p_k}{p} \right) z, E_i, E, E_0, p, r \right]$

$$\phi_2 = \frac{S_2}{S_1} \frac{\phi_1}{a^2} \xi$$

is used as a quasi-similar criterion. This allows the application of similarity methods to radiation protection systems when a significant amount of γ -ray absorption takes place. It is shown that this similarity method can be applied to other forms of radiation, such as neutron propagation. A table is given listing similarity conditions for point, line, and cylindrical radiation geometries. Orig. art. has: 9 formulas, 1 table, and 3 figures.

ASSOCIATION: Institut rezinovoy promyshlennosti, g. Moskva (Institute for Rubber Industries)

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B C

A-1

X-Ray examination of the structure of boron nitride. A. BRAGER (Acta Physicochim. U.R.S.S., 1937, 7, 690-706). Results calc. from X-ray powder photographs of BN are discussed in relation to the data given by Hässel (cf. Norsk Geol. Tids., 1928, 266). From the photograph for BN prepared at 1100° a unit cell identical with that of the 2000° prep. is indicated; probable symmetry class is C_{2v} .
W. R. A.

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1ST AND 2ND ORDERS										3RD AND 4TH ORDERS									
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5 X-ray investigation of the structure of boron nitride. A. Kh. Bragg. <i>J. Phys. Chem. (U. S. S. R.)</i> 11, 24- 32(1938).—BN is hexagonal, a 2.51, c 6.69 Å.; the unit cell contains 2 B with the coordinates $(\frac{1}{3}, \frac{1}{3}, 0)$ and $(0, 0, \frac{1}{2})$ and 2 N with the coordinates $(0, 0, 0)$ and $(\frac{1}{3}, \frac{1}{3}, \frac{1}{2})$. R. C. P. A. 2																			
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<i>BC</i> <i>A-1</i> X-Ray examination of titanium nitride. I. Single-crystal investigation. A. BRAGGS (Acta Physicochim. U.R.S.S., 1939, 10, 693-699).—a for TiN is 4.73 Å. ρ by pycnometer is 4.73, as against the calc. val. 5.43. Possible causes for the discrepancy are discussed. F. J. G.																			
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a-1

X-Ray examination of titanium nitride. II. Structure of some intermediate products formed when obtaining titanium nitride. A. BRAGEN (Acta Physicochim. U.R.S.S., 1930, 10, 887-902). β -TiCl₃·4NH₃ (prepared at -10° and heated to 20°) is cubic, with a 7.72 Å., 2 mols. per unit cell, probable space-groups D_{2h} , D_{2d} , D_{2h}^2 , C_{2v} . α -TiCl₃·4NH₃ (prepared by heating the β -form to 200°) is cubic, with a 3.86 Å., $\frac{1}{2}$ mol. per unit cell, space-groups the same as for NH₄Cl. The at. positions are given for both substances. TiCl₃(NH₃)₂ is cubic, with a 3.86 Å., $\frac{1}{2}$ mol. per unit cell.

O. J. W.

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1ST AND 2ND ORDERS										3RD AND 4TH ORDERS									
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BC A-1 X-Ray examination of the structure of boron nitride. A. BRAUER (Acta Physicochim. U.R.S.S., 1939, 10, 902; cf. A., 1938, 1, 805).—A correction. The space-group of the BN structure is C_{2v} and not C_{2h}. O. J. W.																			
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CA An x-ray investigation of titanium nitride. III. Investigation by the powder method. A. Kh. Breger. <i>Acta Physicochim. U. R. S. S. 11, 617-32(1939)</i> (in English); cf. C. A. 33, 8074⁴.—The lattice parameter of TiN prep'd. from $TiCl_3 \cdot nNH_3$ by heating or from $TiCl_3 + NH_3$ in the gas phase varies from 4.21 to 4.235 Å. between 400 and 1600° and is then const., and it is the same (of the NaCl type) for both methods of prep'n. Below 1400°, many of the Ti places in the lattice are unfilled, but gradually fill on heating; above 1000° the lattice is complete and not subject to further change up to 3000°. The d. increases from 4.5 at 400° to 4.85 at 1000° and 5.1 at 1600° and then remains const. On melting at about 3000°, partial dissocn. occurs and the two-phase system TiN + Ti is obtained. P. H. Rathmann																																																			
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X-Ray investigation of titanium nitride. I. Structure of single crystals. A. C. BAKER (J. Phys. Chem. Russ., 1939, 13, 272-275).—TiN has a face-centred lattice with the spacing 4.22 Å. not in agreement with the density 4.73. J. J. B.																			
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Methods for precision determination of the dimensions of the unit cells of polycrystals. A. Kh. Buzare, Zashchita Lab. 9, No. 1, 55-53(1940).—A review with 44 references. W. R. Henn			
ASH-11A METALLURGICAL LITERATURE CLASSIFICATION			
1ST AND 2ND SERIES		3RD AND 4TH SERIES	
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Real crystals. A. K. Bregg. *Discuss. Adv. 9, 105-106* (1940).—A review covering defects in ideal lattices in and between the elementary cells. Darwin and Zwicky mention the Smekal model. Examples are given of substitution, inclusion, deficiency, multiplication and division in crystal structures. 81 references. F. H. R.

C.B.

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Dependence of the unit cube edge of the compounds
TiC, TiN and TiO on the radius of the metalloid atom.
A. Kh. Breger. *Acta Physicochim. U. R. S. S.* 13, 723-4
(1940) (in English).—The unit cube edge decreases with
at. wt. of the nonmetal owing to decreasing radius, in-
creasing ionization of Ti atoms and increasing electron gas
density.
F. H. Rathmann

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<i>Ca</i> Nature of the chemical bond in graphite and boron nitride. A. Kh. Bregar and G. Zhdanov. <i>Compt. rend. acad. sci. U. R. S. S.</i> 23, 629-31(1940)(in English).-- The one-dimensional Fourier series $\rho(x) = (1/d) \sum_{m=1}^{\infty} F_m \cos 2\pi x$ is built up for the crystal structure of the graphite and BN layer lattices. The distribution of electron density perpendicular to the 001 plane in these substances is similar. About 16% of the electron d. is between layers. This corresponds to one electron per C atom or two per pair of B and N atoms. These electrons account for the elec. cond. of graphite and for its ability to form interstitial structures with alkali metals, acids, etc. The electron average of one per atom for BN indicates that the layers consist approximately of B-N⁺ ions, each of which has an electronic configuration and certain phys. properties like C. The ion layers explain the lack of metallic cond. of boron nitride and its transparency, and suggest the existence of "inorganic benzene" B₃N₃ with structure and properties like C₆H₆. S. R. Korovin		ASS-SLA METALLURGICAL LITERATURE CLASSIFICATION REGIONAL INDEX	

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The Chemical Bond in Hard Compounds.—I. A. Brager (*Acta Physico-chim. U.R.S.S.*, 1941, 14, (3), 297-306).—(In English.) X-ray data obtained by various workers on the compounds TiC, TiN, TiO, VC, VN, and VO are examined and the most likely parameter in each case is selected; these values are, respectively, 4.320, 4.235, 4.16, 4.23, 4.129, and 4.08 Å. From consideration of the electronic structures of the atoms concerned, it is concluded that the chief chemical bond in these compounds is the co-valent one, with the ionic bond also having some influence.—N. B. Y.

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Chemical bond in solid compounds: 1. <i>A. K. B. B. B.</i> <i>J. Phys. Chem. (U. S. S. R.) 15, 927-33(1941).</i> <i>C. A. 35, 5309.</i> <i>F. H. Rathmann</i>																			
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Quantitative determination of the energy of X-ray reflections in
crystal structure analysis. IV. Further development of methods
of micro- and integral-photometry of reflections. A. Il'gar and
V. Kotov (*Acta Physicochim. U.R.S.S.*, 1942, 19, 34-42). The
applicability of the method of micro-photometry is extended to
a blackening of $S_{90} \geq 1.0$ by introduction of corrections for systematic
errors; the method is developed for use with a microphotometer
slit longer than the width of the spot. Data for an intensity scale
show the method to be accurate to $\sim 10\%$. The method of integral

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L. Ya. Kayser

KOMOV, V. P.; BRFGER, A. Kh.

Laboratory of X-ray, Physico-Chemical Institute imeni L. Ya. Karpov, Moscow (-1941-)

"Quantitative Determination of Integral Energy of Roentgen (X-ray); Interference in Structural Analysis - III. A Rapid Method of Integral Photometry of Interference Spots." Zhur. Fiz. Khim., Vol. 17, No. 1, 1943

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Lab of X-ray, Physico-Chemical Institute imeni L. Ya. Karpov (-1941-)

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